

PROOF-OF-CONCEPT EVALUATION: PASSIVE IN-SITU BIOREMEDIATION OF CHLORINATED-BENZENE GROUNDWATER CONTAMINANTS USING GREEN TECHNOLOGY

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A field Proof-of-Concept evaluation, using injection and passive additive deployment methods, was performed to demonstrate anaerobic remediation of chlorinated and nonchlorinated-benzene groundwater contaminants. Work performed as landfill closure/remediation program, in compliance with overseeing Department of Environmental Management Order of Approval. Results of the 7-month evaluation demonstrated > 90% decrease in site Contaminants-of-Concern (COC) 1,2- and 1,4-dichlorobenzene, chlorobenzene, and benzene without costly long-term aboveground support equipment.

Site is a former landfill. COCs within soil/waste saturated zone 'Targeted Treatment Zone' (TTZ) with smear zone/dissolved phase contaminants, within/beneath suspected groundwater contaminant source. Additive selected (BioStryke® TPHENHANCED™) selected for ability to leverage existing site conditions and facilitate passive-aggressive contaminant biodegradation/desorption. Deployment was performed using PRS deployment units and actively in two 8-inch injection wells, with Areas-of-Influence (AOI) of < 3-feet and 18-feet respectively.

Injected additive was blended with water to achieve 525 mg/L slurry, deploying 3,400 and 5,700 gallons. Passive additive deployment was by PRS units, each containing 2-pounds of dry additive, installed two at a time. PRS units remain suspended and undisturbed for a prescribed period of time in 2-inch monitoring well(s) to amend groundwater; being replaced bi-weekly, with baseline/performance monitoring/sampling/analytical testing performed prior to and concurrent with PRS deployment, for a total of 11 events over the 7-month evaluation.

Results of the 7-month Proof-of-Concept evaluation demonstrated:

- An Order-of-Magnitude (OM) Decrease in Benzene to below the Site MCL (5 mg/L)
- An average gross %Reduction in Chlorobenzene of 90%
- An average gross %Reduction in 1,2-Dichlorobenzene of 93%
- An average gross %Reduction in 1,4-Dichlorobenzene of 96%

Secondary supporting evidence indicative of additive induced anaerobic biodegradation included: increased concentrations of additive followed by dramatic decrease, significant decreases in COD levels, and increased pH levels. PRS deployment units demonstrated significantly lower performance with little overall reduction in COC concentrations; however, increased contaminant bioavailability/biodegradation was observed, evidenced by 4X increase in dissolved phase Chlorobenzene followed by decrease to baseline. Overall dichlorobenzene decrease of 59% observed in PRS amended groundwater.

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